THE VETERINARY RECORD

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THE HALIFAX DOCKING CASE.

It is stated that the Royal Society for the Prevention of Cruelty to Animals has withdrawn from the appeal lodged when the magistrate dismissed the prosecution of a Veterinary Surgeon for docking at Halifax. We have been expecting this strategic movement for some time. The management of the R.S.P.C.A. discloses no stronger sentiment than that "wisdom of the serpent" for which honest men have only a sneering respect. If the Society really desired to settle the matter it could have no better opportunity than is afforded now that a determined defence would be made. Running away after giving the challenge is not a courageous or altogether fair proceeding but it is astute. It recognises that if the appeal were decided against the Society no more convictions before petty courts could be obtained, whereas by evading the decision of a High Court successful prosecutions may be sustained wherever a magistrate can be found who personally objects to docking. We feel sure that the subscribers to the R.S.P.C.A. will not approve of this action on the part of the executive autocrat who runs the concern. They can only desire to prevent cruelty, and to trust Her Majesty's Judges with the decision of what is or what is not cruelty. The ladies and gentlemen who subscribe handsomely to protect dumb animals would never approve of a procedure which fears to have a legal definition of cruelty as applied to a distinct and definite operation. They would say "let us know if it is cruelty and, if it is, punish the perpetrators uniformly and universally, but do not persecute poor men in one place and encourage them in another." This is the honest and direct thing to do, and both sides should be willing to accept the High Court as arbitrator.

As the R.S.P.C.A. shirk the decision it remains for their victims to take the initiative in obtaining a final decision. This can be done, and the position forced only by waiting for a conviction, and then giving notice of appeal. The funds in the hands of the defence are not exhausted, and breeders and dealers have offered liberal contributions for the purpose of having the matter settled. It will be necessary to form a small permanent committee to keep watch for a conviction, and then to have the question decided once for all on its merits. Should the Society not be anxious for a trial the question can be put forward by any "informer" who need not possess a uniform imitating the police.

THE VETERINARY REPORT.

Continuing our notice of this report from last week we return to Mr. Cope's remarks on glanders. He says "It must, however, be borne in mind that mallein, like tuberculin, has the power of producing constitutional disturbance or re-action when only the most minute lesions of those diseases are present. It would follow, therefore, that nothing short of a microscopical examination of the whole of those parts in which the bacillus of glanders finds a habitat would justify anyone in stating that the animal which had reacted was not affected with the disease." With the statement of fact in the first sentence of this paragraph we agree. The two agents do produce marked reaction with very little appearance of disease. In very many cases decided reaction occurs in an animal which in all probability would live and be useful for years without showing clinical indications of disease. The owner of these animals, if he can afford it, does well to kill such possible centres of infection, but how many can afford the sacrifice? To slaughter on the indications of mallein and tuberculin is the very best method of stamping out glanders and tuberculosis. As the stamping out of disease by either a central or local authority can only be supported on the plea of public good, the inference to be drawn from Mr. Cope's words is clear, viz., that authorities should, by paying fair compensation, assist owners to get rid of the disease. This is just what they do not. They are pleased to pass rules, to conduct prosecutions, to interpret statistics, to claim credit for any improvement, and to advise the horse-owner to stamp out disease at his own cost, whilst they fail to protect him from re-infection. It is sad to note that during the last thirty years more than 60,000 horses have died in England from glanders—from a disease which might be stamped out more easily than any other contagious disease affecting animals.

It is a pleasure to turn from the apathetic treatment of glanders to the sound sense and well directed energy which marks the dealings of authorities with rabies. In 1895, 672 dogs were returned as rabid. In the beginning of 1896 Muzzling Orders were imposed by the local authorities in many infected districts, with the result that the loss for the year was reduced to 438. London, Surrey and Middlesex were the chief centres of the disease, and whereas these three counties in the month of January returned 46 cases, in December only 8 were discovered. We must take exception to one remark of the Chief Veterinary Officer, who draws attention to "how the disease gradually decreased under the effects *of the muzzle*." It ought never to be overlooked that it is *not the muzzle* but the Muzzling Order which does the good. The muzzle without the rest of the Order would be useless, the Muzzling Order without the muzzle might be effective.

Anthrax receives very short notice in the report, but reference to the statistical tables shows that the returns of the disease have considerably increased

since the Anthrax Order of 1886 was issued. Probably this increase of figures only means that for the first few years many outbreaks were not reported. It is, however, serious to find that in 1896 no less than 64 counties were infected and over 900 animals attacked.

The distribution of the disease is peculiar and, as was long ago pointed out by Professor Axe, not proportionate to the number of cattle in a district. The counties showing the greatest number of outbreaks are—

	1896	1895	1894
York (West Riding)	42	38	32
Aberdeen	32	25	27
Somerset	28	21	17
Cornwall	25	28	20
Devon	23	6	10
Leicester	23	17	13
Mid-Lothian	20	7	14
Northampton	17	21	16

As the other counties average about four outbreaks each it seems suggested that some local conditions exist in the above eight which predispose to infection. Can it be importation of infection by hides, hair or wool? If so legislation is required.

Sheep-scab, says Mr. Cope, "remains as prevalent as ever." As the Government contribute money for the suppression of other diseases we venture to suggest that it might supply some 15 travelling dipping apparatus, to be stationed in the worst infected districts, and that the local authority should then join with the owners in the expense of using them.

The report of the Principal of the Animals Division commences with an historical sketch of the rise and development of legislation against disease in animals. This we have extracted in full. Very interesting are his remarks on the importation of cattle and sheep from foreign countries and from Ireland. Increased attention is now given to the treatment of animals during transit by sea and land, but great difficulties meet all attempts to make the life of stock on ship-board comfortable.

The Principal remarks that the disinfection of railway trucks and pens have been satisfactorily carried out, but we fail to find any reference to horse-boxes. Here is another illustration of the curious fact that whilst some classes of live-stock are well looked after the poor horse is utterly neglected—Why?

This year Major Tennant avoids reference to the pathological conditions which affect the prevalence of disease, and confines himself to the "administrative point of view." From this aspect he treats of pleuro-pneumonia, rabies, and swine-fever. The last two pages treat of the other duties—over and above the control or prevention of disease—which enlarge the scope of the department from merely "Veterinary" to "The Animals Division." These duties arise out of the Markets and Fairs (Weighing of Cattle) Act 1887, and consist of receiving from local authorities figures relating to the weights of cattle. Easy employment for one boy clerk, but a poor excuse for destroying an old department!

A CRITICAL PERIOD IN THE DEVELOPMENT OF THE HORSE.

Professor J. C. Ewart, F.R.S., has just issued through Messrs. Adam and Charles Black, a most interesting pamphlet of 30 pages, in which he attempts to answer the question why so many mares "break service from the sixth to the ninth week."

The Professor says:

"At a meeting of the Central Veterinary Medical Society of London, at which I exhibited a number of young horse embryos, I had barely time to allude to what may prove a subject of some practical importance, viz., the apparatus provided for nourishing the embryos during the early weeks of development. This apparatus (which consists mainly of what are known as the fœtal appendages) I was led to consider from a breeder's point of view by Lord Arthur Cecil asking me, about a year ago, if I could account for so many mares breaking service from the sixth to the ninth week. At the time I could only answer that I agreed with his lordship in believing that it was in many cases due to the detachment and escape of an embryo. I have frequently found mares all right, so far as I could judge, at the end of the sixth week, and all wrong some weeks later. This seems to be not an uncommon experience, more especially at the beginning of the breeding season, hence it is always urged by experts that mares should be "tried" frequently during at least the first two months. If holding at the end of the ninth week no further trouble is, as a rule, anticipated. But no one has, as far as I am aware, explained why the breeder experiences so many difficulties during the earlier weeks."

The author next gives a general sketch of the fœtal appendages, comparing those of the horse with those of the chick and the opossum. He thus makes clear the way in which a fœtus derives its nourishment, and the methods by which it is anchored in its place.

Next descriptions are given of the conditions presented by a horse embryo at the fourth, fifth, sixth, seventh and eighth week of development. From there the inference is drawn that changes in the methods by which nourishment is supplied, and in the way the fœtus is fixed are predisposing causes, specially active during the third and sixth weeks, but even more so at the end of the seventh.

We have taken the liberty of quoting the "concluding observations" in full, and trust that in so doing we are not unfair to the author. Any of our readers who stop short at our extract will miss a treat and will fail to grasp the argument. It is seldom that a complex subject like this is handled with the grace and lucidity given it by Professor Ewart, and as the price of the pamphlet is only 1s. no veterinary practitioner should be without it.

Concluding Observations.

"Evidently, from what I have already stated, breaking service may be due either to abnormal development of the embryo or to its surroundings being unsuitable.

Nature may be said to have provided against what we call breaking service. When one thinks of the millions of eggs produced in a single season by the cod and certain other fishes, one is apt to suppose that there is no relation between the number of ova and the wants of the species. On the other hand, the solan goose lays but one

egg a year, and the elephant may not mature a score of eggs in a hundred years. I believe a mare may ripen and shed from ten to twenty eggs during the year. If this is the case, bearing in mind that the period of gestation is eleven months, evidently in the mare provision has been made against accidents during the earlier weeks of the breeding season. Considering first how the embryo may be concerned with breaking service, I may point out that if the egg or the sperm has been insufficiently nourished, or, it may be, over nourished, the segmentation of the egg may be abnormal; or, if this is successfully accomplished, a feeble embryo may be the result—an embryo with, it may be, a small allantois, or with an imperfect yolk sac circulation, or an embryo incapable of anchoring itself to the lining of the uterus. Or the embryo may reach the seventh week, but either because the allantois is insufficiently developed, or because it lacks the energy required to throw out the all-important villi, the more permanent relations may never be established, with the result that it is sooner or later discharged. Hence the necessity of having vigorous germinal cells to start with—in other words, of the breeding stock being in a healthy and vigorous condition; for whether it is or is not possible to transmit acquired characters, it is certainly possible, by means of unsuitable surroundings and injudicious feeding, to diminish the vitality of both the eggs and sperms.

With regard to the immediate surroundings of the embryo, probably the conditions are oftenest rendered unsuitable for the development of the embryo by the unhealthy state of the uterine mucous membrane. The uterine secretions may be acid instead of alkaline (they are said to be acid in mares that have frequently broken service; acid secretions destroy the sperms as they pass upwards through the uterus), excessive or the opposite. They may, on the one hand, be unsuitable for the due nourishment of the embryo, or they may prevent it being properly fixed. At a later period, by accumulating between the basis of the villi, the secretions may actually dislodge them from their pits. But even should the mucous lining of the uterus be normal, neither too congested nor too anæmic, nor yet too irritable, the muscular fibres which enter so abundantly into the uterine wall may be out of order, or the nerves supplying them in a state of unrest. The fibres in the neck and body of the uterus may be relaxed or wanting in tone, or the fibres of the horns, or it may be of the whole organ, may be subject to frequent spasmodic contractions. Whether such contractions result from local irritation or general nervous excitement, if excessive and long continued, the chances of the embryo being long retained will be extremely small.

The question now arises, can anything be done to prevent mares breaking service? In dealing with the horse, the fact must never be lost sight of that he is an extremely high-strung animal, liable in a panic to completely lose the little self-control he has inherited from his wolf-worried ancestors. This nervousness, which was his salvation when in a wild state, has in some respects been increased rather than diminished by the unnatural life it is now his lot to lead. The horse has strong likes and dislikes, and frets often when separated from his companions. This being the case, it will be easily understood that sudden changes—changes of temperature, of food, of companions, changes of his surroundings or environment generally, will greatly influence mares, more especially at the breeding season.

It is well known that changes influence more or less markedly all kinds of animals. A change from one country or one district to another may, *e.g.*, lead to increased fertility, or it may result in complete sterility. This is doubtless because the reproductive system is extremely sensitive to changes of every kind. In several cases mares which I received from a distance required several months to adapt themselves to their new conditions, and in all cases the reproductive system was the last to assume its normal state. But what bearing has this on the subject in hand? It all points to a very careful and thoughtful treatment of mares at the beginning of the breeding season. For example, now (April) that the grass is coming on, I might have several mares mated with my zebra—mares which have been under cover and generously fed during the winter—and then turned out to grass in the same field. The change from the loose-boxes to the field would be nearly as great as from the South of England to the Pentlands, and if the reproductive system is most sensitive to changes, the chances would be strongly against their settling. But even if proof against the effects of substituting an outdoor for an indoor life, turning them out one by one immediately after mating would be most unwise. Some mares, even when in foal, "tease" other mares as persistently as a horse. In this way, the excitability which should be allayed, or at least allowed to subside, might be kept up if not exaggerated. At the beginning of the breeding season changes of food, of temperature, and of the surroundings generally should be made as carefully and judiciously as possible; and during at least the first two months after service the mares should neither be over-excited nor over-exerted, neither chilled nor overheated, neither over nor under-fed, and, in fact, all extremes should be carefully avoided; and it should be remembered that drugs readily reach, and may profoundly influence, even young embryos.

If in this case being forewarned is to be forearmed, some good may result from the conditions under which the horse embryo exists during the early weeks of development having been shortly explained. The practical application of the facts established may well be left to breeders and veterinarians. I may, however, in conclusion, make the following suggestions:—

1. That mares which have been indoors during the winter, and which are to run at grass during the summer, should be, as it were, acclimatised before they are served, *i.e.*, they should be allowed to run out night and day for two or three weeks, in order to have time to adapt themselves to the change of food, the somewhat marked variations of temperature, and to their new surroundings generally.

2. That mares, more especially excitable ones, should be served in the evening, and shut up apart from other mares or geldings during the night. They should then, until the periodic disturbance has subsided, be kept in a paddock as far removed as possible from mares or geldings likely to tease them.

3. That when any signs of œstrum are detected in a mare (whether she has been previously presented to the horse or not), she should be removed from mares believed to be already in foal.

4. That each mare should be carefully watched from week to week, and periodically—every ninth or tenth day—tried until the critical period has been successfully passed.

5. That mares backward and out of condition in the spring should be allowed for some weeks oats at least once a day; for unless they are in a healthy and vigorous state, ova may not be discharged until the summer is well advanced; or, if ovulation takes place, the eggs may be so impoverished that the embryo may fail to survive the critical period, or, if it succeeds in this, develop into a small, weedy foal. It is all but impossible, apparently, for a mare to produce strong, vigorous twins capable of eventually reaching the size of their parents. This is evidently a matter of nourishment. Hence, if the dam is out of condition, or if the fœtal circulation is weak, or the allantoic villi in any way unsatisfactory, the foal, if born alive, is not likely to be a source of credit or profit to the breeder."

TUBERCULOSIS IN PIGS.

From Mr. Cope's report for the year 1896 some useful knowledge concerning tuberculosis may be gleaned, not only as to its prevalence amongst swine but as to the form in which lesions are most often found. He says:—

"The following Table which is otherwise similar to those prepared in former years includes for the first time the number of cases of tuberculosis detected in the viscera sent for examination to the laboratory. It will be observed that tuberculosis is by no means a common disease of the pigs of this country, a fact which may be regarded as somewhat remarkable when it is borne in mind that pigs have access to and are frequently fed upon the offal of diseased animals.

Experience in the laboratory demonstrates that the lesions of tuberculosis in swine are rarely found in any other organs than the lungs and spleen; That they are very seldom met with on the surface of the serous membranes, and when present in the lungs they nearly always assume the form of miliary deposits. In this respect tuberculosis of the pig more nearly resembles tuberculosis in the lungs of man than it does when it attacks the lungs of other domesticated animals.

MONTHLY RETURN OF POST-MORTEMS OF SWINE MADE DURING THE YEAR 1896.

Month.	Number of Viscera examined.	Number of Swine-fever Cases detected.	Number of Diseased Hearts.	Number of Cases of Tuberculosis.
January -	1,728	532	41	32
February -	1,588	558	30	25
March -	1,405	462	34	21
April -	1,277	589	24	14
May -	1,288	638	15	18
June -	1,216	523	16	5
July -	941	378	24	5
August -	881	382	42	10
September -	878	358	36	12
October -	669	301	44	2
November -	605	263	25	10
December -	745	304	14	5
Total -	13,221	5,288	345	159

These statistics are based upon examinations of pigs of all kinds and ages, from all parts of the Kingdom. Probably the proportion of tuberculosis found fairly represents that prevailing amongst swine—*i.e.* rather over one per cent. The chief method of transmission from pig to pig is certainly through the common feeding trough—by ingestion. And yet the disease is rarely found in any other organs than the lungs and spleen.

Veterinary Lectures.

Mr. Brown, M.R.C.V.S., Glasgow, recently completed a course of three lectures which he has been delivering in the Volunteer Hall, Aberlour, under the auspices of the Banffshire County Council. Mr. R. Green, county councillor, Ruthrie, occupied the chair. The subjects treated were the feeding of horses and cattle, and the general hygiene of stable aad byre.

NATIONAL VETERINARY MEDICAL ASSOCIATION.

HEREDITY IN ITS RELATIONS TO THE DISEASES OF ANIMALS.

Abstract of paper read by J. R. U. Dewar, F.R.C.V.S., Principal, Royal (Dick) Veterinary College, Edinburgh, at the meeting of the National Veterinary Association at Reading, August, 1897.

In this matter-of-fact stage of the world's history, when every perceptible effect is believed to have a material cause, when a belief in mythology and the supernatural is relegated to the confines of civilisation, to the ignorant and uneducated, to those who live in the past without knowledge of the advances and discoveries of modern science, a belief in the influence of heredity is also being banished from consideration, as being too hypothetical, too little capable of proof, to have much influence in the ætiology of disease in any form.

But those who interest themselves in the subject know that as the investigations of biologists lead them nearer and nearer to the primary step in the formation of new organisms, more and more influence is being ascribed to inheritance or heredity, and less and less to extrinsic or environmental causes.

But it will be well to define as clearly as possible what is meant by heredity. That this is necessary is painfully evident from writings in our professional journals, in which the terms "hereditary" and "congenital" are frequently confounded, and used as equivalent and interchangeable. The familar aphorism, "Like begets like," expresses very fairly what is meant by heredity. It is "that property by which qualities and characteristics are transmitted from parent to offspring"; "the principle or fact of inheritance, or the transmission of physical and mental characteristics from parent to offspring, regarded as the conservative factor in evolution, opposing the tendency to variation under conditions of environment." That definition is sufficiently explicit meantime. Later on it will be necessary to inquire whether any explanation can be given of the facts of heredity.

Congenital, on the other hand, means "anything existing in the individual at birth." "Any peculiarity or characteristic, any abnormality or malformation, it may be a defect or a deficiency, that is in existence or demonstrable at birth, is congenital." For example, baldness in the human subject is a common hereditary characteristic; it is perhaps never congenital. An animal born *minus* a limb, due to amputation *in utero* from some fibrous band becoming tightened round it, ultimately strangulating it, has a congenital malformation, not a hereditary one.

Malformation and abnormalities are often congenital, often due to mechanical causes, to violence or disturbance while development is going on *in utero*, or even for want of space for development to take place in a normal uniform manner.

On the other hand, very minute hereditary traits and characteristics that would pass unobserved in the lower animals are quite common in man. The droop of an eyelid, the curl of a lip, the position and form of the teeth, or the form of the lobes of the ear, are frequently transmitted from generation to generation.

Then why is it that a microscopic animal cell, a minute particle of living protoplasm, should exercise such an enormous, such a far-reaching influence in the ultimate development of the individual? Is there no possibility of obtaining a closer, a more intimate knowledge of how this influence is exerted than by saying that "like begets like," or rather "like tends to beget like"; that each individual tends to develop in the likeness of his pro-

genitor? This question had a great attraction for philosophers among the ancients, as it has for biologists and scientists in the present day. In order to a more accurate perception of modern views of heredity, a reference to some opinions and theories that have been held regarding it will be desirable.

Amongst the best known of the modern theories is Darwin's theory of pangenesis. It is, however, not quite so original as is generally assumed. Thus Democritus, about 450 B.C., affirmed that the "seed" or germ was composed of atoms contributed by all parts of the animal body, and that the several parts were reproduced from their original atoms.

Buffon also, about the middle of the last century, indicated his belief in a somewhat similar formation of the germ elements. And Herbert Spencer suggested their formation from what he termed "physiological units" collected from all parts of the body. It is, however, undoubted that Darwin's work was, to a considerable extent, known amongst scientists previous to the publication of Spencer's hypothesis. Darwin's theory is briefly—

(*a*) Every cell in the body, not too highly differentiated, throws off characteristic gemmules.

(*b*) There multiply by fission retaining their special characteristics.

(*c*) And become specially concentrated in the reproductive organs.

(*d*) In development similar germs unite and grow into cells like those from which they were originally given off.

Most of the theories of heredity elaborated have reference more or less directly to Darwin's theory.

The theory of heredity elaborated by Weissman—not suddenly, by any means, as if it had come upon him like a revelation, but by slow degrees—has attracted more attention than any other in recent years, principally owing to his refusal to accept in any form the possibility of the transmission or inheritance of acquired characters,—a doctrine which, if not unanimously accepted hitherto, has not been so pointedly and directly challenged.

Weissmann's theory has been briefly summarised by Prof. Thomson as follows:

"(1) In each development a portion of the specific germinal plasma ('keimplasma') which the parental ovum contains is not used up in the formation of the offspring, but is reserved unchanged for the formation of the germinal cells of the following generation.

"(2) What is actually continuous is the germinal protoplasm—the 'keimplasma'—'of definite chemical and special molecular constitution.' A continuity of germinal cells is now rare; a continuity of intact germinal plasma is constant.

"(3) This keimplasma has its seat in the nucleus, is extremely complex in structure, but has, nevertheless, an extreme power of persistence and enormous powers of growth."

If the problem of inheritance is an abstruse one when looked at from the point of view of the higher animals, where the mechanism of the reconstruction of the organism has to be accounted for in any satisfactory explanation, it is by no means simple even in the case of unicellular individuals. But is seems easier to understand how a single cell should resemble its immediately preceding ancestral cell than in the case of the higher animals, where an incalculably greater amount of differentation and architectural development are required. For, as Prof. His has said, "to think that heredity will build organic beings without mechanical means is a piece of scientific mysticism." But to put it direct: how the ancestral characteristics lie hidden in the germ-cell, to become developed in the new individual, is a problem still waiting solution. To say that no progress has been made in its elucidation would be incorrect. A great deal has been done in comparatively recent years by earnest, patient study and careful experimental investigation to explain and clear up the mechanism of reproduction. But the mystery of heredity still lies hidden.

In all the higher forms of life fertilisation or fecundation requires the union of two cells—the union of what used to be termed a sperm-cell and a germ-cell. Biologists now prefer to say the union of two germ-cells, one of paternal and one of maternal origin. In all the higher forms of life the activity, the energy of cell-division tends, after a varying period of time, to become arrested, the individual dies. The preservation of the species, or the energy of cell-division, can only be maintained by the admixture of living matter from another cell before the cell activity in the first organism has been arrested. According to the older hypothesis, the essential end of the conjugation of the cells was the restoration of this growth-energy or the rejuvenescence of the individual. But Weissmann rejects this theory. He does not believe in a fertilising substance as usually understood, nor in the object of fertilisation as being "the vitalisation of the germ." He states that fertilisation has no significance except the union in the single offspring of the hereditary substance from two individuals,—or, as he puts it in another place; "the union of the different hereditary tendencies of two individuals" while he regards the union of the two cells—what has been termed "the vitalisation of the germ"—as only the means by which the process is effected.

All biologists seem agreed that hereditary characteristics are transmitted to the offspring from each parent in an equal degree. At first sight, looking to the comparative size of the two germ-cells, this seems very unlikely; but when it is kept in view that only the nuclei unite to form the new individual, the apparent disparity between the two uniting organisms disappears. The head of the spermatozoon, the male germinal element, is almost entirely nuclear, The thin layer of cytoplasmic substance that surrounds it only resembles a thickened cell-wall, so that the uniting nuclei are approximately alike. It is unnecessary to refer to the separation of the polar bodies, but in mitotic cell division, after the spermatozoon has entered the fema le germ-cell or ovum, and the two nuclei approach each other, amphiaster or spindle is formed. While this is taking place the nuclear substance, or rather the chromatin—so called by Flemming, owing to the readiness with which it absorbs staining agents—which has been scattered throughout the nucleus, becomes arranged into a spireme or thread, usually convoluted, sometimes in pieces. In either case it ultimately breaks transversely into a number of separate bodies known as chromosomes, which may be in the form of rods or loops, straight or curved. This chromatin is the idioplasm of Nägeli, the keimplasma of Weissmann, and the chromosomes or rods are the idants of the latter. The nucleoli seem to dissolve and disappear, or are cast out like the polar bodies. It is not certain that in all cases conjugating nuclei becomes actually fused before division. What is certain is that the chromosomes from each nucleus arrange themselves together in a line passing through the middle of the amphiaster or spindle, forming what is known as the equatorial plate. The significance of this arrangement lies in the fact that the chromatin splits throughout its entire length into two exactly equal halves, each daughter nucleus receiving a precisely equivalent portion of chromatin from the mother nucleus, and that to the chromatin alone is now generally ascribed the conveyance of hereditary characteristics.

Whether the nuclei have been completely fused, or whether they have been merely in apposition, the chromosomes meeting in the equatorial plate,—after splitting of the chromosomes they gradually diverge, and group themselves together towards opposite poles of the spindle.

There they form the nuclei of two separate cells—daughter cells,—which the entire cell—mother cell—forms by dividing in two through the centre of the spindle.

This process of mitotic cell division has been followed in so many different species that Wilson has laid it down as an established principle that "every species of plant or animal has a fixed or characteristic number of chromosomes, which regularly recur in the division of all its cells, and in all forms arising by sexual reproduction the number is even." That is, each conjugating nucleus, whether from a paternal or maternal germ-cell, contributes an equal number of chromosomes to the segmentation nucleus, from which is built up the new individual. Thus in some sharks the number is thirty-six; in as different species as the mouse, salamander, trout, and lily it is twenty-four; in the ox, guinea-pig, and man, sixteen; in some nematodes eight, in others four or two; and so on.

Having now seen what is meant by the continuity of the germ-plasm, the nucleo-plasm contained in the chromosomes of the nuclei in mitotic cell division, it will be well to inquire how far it assists in solving the problem of heredity. Even admitting that the life is passed on in the living "keimplasma," a material substance from one generation to another, how is such a minute particle of matter able to convey, almost unaltered, qualities, forms, and characteristics with the certainty of a universal law? Notwithstanding the advances that have been made in our knowledge of the physiology of the cell within the last twenty years, this question cannot be answered. It has been ascribed to habit, to instinct, to the memory of organised living matter. But even if correct, that does not help us much further forward, and will not account for the repair of mutilations in the lower forms of animal life. Some consider that it may be due to the persistence of a supposed undulatory movement or wave motion in the ultimate organic molecules; others, that it is due to a sort of chemical pangenesis. Put in its simplest form, it is that "the same substances and mixtures of substances are reproduced in quantity and quality with regular periodicity."

Regarding the inheritance of acquired characters, almost absolutely denied by Weissmann, it must be admitted that if he is correct the influence of heredity on disease must be very remote. Most diseases have been acquired. It cannot be admitted that disease is an essential requisite in the animal economy.

It has been argued that as there is no direct proof of the transmission of mutilation, "no modifications of the sources affected by environment or by use or disuse can be transmitted to the germ cells from which the next generation springs. They are, therefore, of no account in the modification of the species."

Admitting that there is no proof of the inheritance of mutilations, neither is there any proof that if the mutilations were continued as long as it would take to involve a single new species in the theory of the intermingling of the ancestral plasms alone, they would not become hereditary. What is the duration of the life of a single experimenting biologist to the time taken for the evolution of a new species?

Weissmann admits that at times nutritive changes may produce "ever so little modifications in the molecular structure of the 'keimplasma.'" This has been ably criticised by Prof. Thomson; he says, "A continuance of many 'ever so littles' may amount to much." A Scotch proverb well expresses it, "Many a little makes a meikle." In the course of a thousand generations it might result in a new species. Nor has experimental inquiry in regard to this question been resultless. It has been found that by altering the quantity and quality of the food supplied to tadpoles the sex of the individuals can be altered. More nourishing food raised the percentage of females from about 50 to about 90 per cent. And in the case of the bee, it is well known that the nature of the food supplied to the embryo determines the character of the resulting individual.

If the nature of the food is sufficient to cause such a radical change as an alteration in the sex of the individual, surely smaller changes may be induced by long-continued environmental causes. It is said that the reappearance of variations is usually due to the individual being exposed to similar functional and environmental causes. Precisely so, and if continued long enough they undoubtedly become hereditary. On no other theory can the value of pedigree be explained. Every breeder knows that a sire, however good a specimen he may be individually, is of comparatively little value in the stud or herd unless he is come of a good strain, unless he has a good pedigree. To maintain the purity of the strain, the continuity of the good qualities, is the end and aim of all our stud and herd books. The longer the pedigree, if it consists of individuals of the same type and character, the less likely is there to be a departure from that type in the offspring. Every horse-breeder will acknowledge what, for want of a better word, is termed the prepotency of the thoroughbred sire; and the longer the line of high-class progenitors, the more is this marked. The reason for this is that great attention has been paid to their purity and character through a long series of generations. Compared with the thoroughbred, the prepotency of the Clydesdale is a long way behind. Equal care has not been given to the breeding of the latter for anything like the same period of time. Yet the best bred thoroughbreds can be reduced to useless weeds in a generation or two. What is this due to if not to association and environment—to extrinsic influences? It is due in part, no doubt, to improper mating, but also to improper management and feeding of the young growing animal.

The heredity that has passed under review has been mainly related to form, configuration, and function, and may be considered as due to physiological processes. From a pathological point of view, as already indicated, the transmission of characters, qualities, or peculiarities acquired during the life of the individual is of greater importance. No one will question the fact that heredity plays a prominent part in the causation of disease. As Dr. Pearson Irving puts it, "Heredity is a prolific source of predisposition." From the earliest times, when men began to record their impressions of the course of human life, heredity has been looked on as of the first importance. That children tended to resemble their parents in form, in colour, even in voice and gesture, could not escape observation. That the members of some families live longer than do those of others apparently equally robust and well formed does not admit of dispute. Even amongst the domestic animals the thoroughbred horse is acknowledged to have a longer average of life than the heavy breeds. Amongst dogs also different varieties are subject to different diseases and types of diseases, and these diseases may serve to carry off a large proportion of the variety at an earlier age.

It is often difficult, if not impossible, to say whether an undoubted predisposition should be ascribed to an inherited or acquired pathological property transmitted to the offspring, or to some physiological or even anatomical variation in the tissues or organisation of the individual. That predisposition to disease is transmitted in both these ways is undoubted. In connection with the first, Sir James Paget says, referring to cancer, "The parent even in seeming health may communicate to the materials of the offspring the rudiments of yet future diseases, and these rudiments must in the case before us be such modifications of natural compositions, as in the course of many years shall be developed or shall degenerate into materials that will manifest themselves in the production of cancer. There is surely in all science no fact so strange as this." The latter is well illustrated in

those morbid conditions occurring in the limbs of horses, giving rise to lameness, which are known as ringbone, sidebone, curb, etc.

But is not the question of whether a transmitted predisposition to a disease is an inherited or an acquired one, more one of degree than of kind? It has been already stated that disease cannot be looked on as a necessity of the animal organism, as originating with the species or race; therefore it must have been acquired some time, at some stage of the family history. Is a peculiarity or characteristic to be termed "acquired" when only transmitted from parent to offspring, and hereditary when from grandparent or further back? To say that it is in all cases "acquired" when due to external causes does not solve the problem, as the causes are very often altogether obscure.

How disease is transmitted is a difficult question. It is generally held that it must be through the generative cells being first influenced by the disease, the germinal matter of the cell, the idioplasm being passed on to the new organism. But there are exceptions to this rule. As the result of the infective disease, immunity from the disease often occurs in the individual—the parent organism. Supposing the individual to be then pregnant, the immunity is often shared by the offspring—the then existing embryo. In that case the immunity must be conveyed by the circulating fluids. But it will be said, this individual must presumably have suffered from an attack of this infective disease while *in utero*. Granting the likelihood of this, the immunity does not always stop at the first generation, it is continued in the second, and in that case the reproductive cells of the organism must have been influenced through the soma—through the body-cells of the individual. There is more than probability that this is the case.

There can be no doubt that, as far as disease is concerned, peculiarities and predispositions occasionally arise in the individual without any trace, any history of their existence in the ancestry. It may not be possible either to trace them to external influences. Still, the chances are that external influences, that association and environment, have celled them into prominence. However that may be, those pecularities, those predispositions, may reappear for three or four, or six or eight generations. It may be skipping some to reappear in a more marked degree in the next,—atavism it is termed,—but ultimately disappearing altogether from the family. The individuals sometimes become separated by oceans and continents, but still the hereditary predispositions become manifest. The similarity of association and environment become difficult to trace.

Most of the acute specific diseases may be greatly modified by predispositions. I have elsewhere mentioned the case of a cow and two of her daughters, which were the only survivors of a small herd of about thirty cattle attacked by rinderpest in the winter of 1865—6, an example of hereditary partial immunity. Those who can remember outbreaks of pleuro-pneumonia before the stamping out to that disease was enforced, will have seen animals, equally exposed to contagion with others, withstand the disease, not only for months while those around them became affected, but in many cases escape it altogether.

That sometimes animals became attacked by disease after resisting it a long time, is not due to their not having come in contact with the contagion previously, or to their receiving a larger dose of it subsequently, bnt to a diminished resisting power, to what might be termed a diminished immunity. This may be due to a loss of vitality, to a comparative debility brought on by other disease, by want of suitable food, by overwork and exhaustion, or by bad hygienic conditions. It is very seldom that influenza will attack all the horses in a stable. Some may die, others survive a severe attack, some experience a mild attack, and some escape altogether. As a rule, all are equally exposed, but all are not equally predisposed. And while it is apt to assume different types in different outbreaks, still in the same outbreak, in one the larynx will be most affected, in another the lungs, in a third the pleura, and in a fourth the digestive organs. The probability is that in the different animals the organs affected were most predisposed to the disease.

A few of those diseases that are undoubtedly hereditary are—of nervous affections, insanity, epilepsy, chorea, roaring, asthma, stringhalt, shivering, and temperament including vice and nervousness: skin diseases as eczema, psoriasis, verrucæ; constitutional diseases as cancer, gout, tuberculosis; diseases of the circulatory organs—heart disease, arteritis, atheroma, aneurism, apoplexy, hæmophilia; of the digestive organs—colics, diarrhœa, constipation; of the urinary organs—diabetes, urinary calculi; of the locomotory organs—almost all diseases that cause lameness. Even sprains may be sometimes considered hereditary, from inherited conformation and liability to injury. Also various degenerations. Space will permit but a few of these to be considered as examples.

Shivering may be taken as a type of nervous affection. It is undoubtedly hereditary. It is a disease once common in the heavier class of horses, but owing to the discredit attached to it seems to be now more rare. The mere suspicion of shivering is sufficient to condemn the best stallion ever reserved for stud purposes. I remember a big, powerful, cart-bred mare, a slight shiverer. It interfered very little with her usefulness, and she continued a good worker well into her teens. A foal was bred from her, which grew into a big, powerful-looking filly. It was only when she was being trained, at three years old, that shivering showed itself so distinctly that very little work was asked from her for another year. But when put to the test the following spring she became perfectly useless, and her owner readily consented to have her destroyed.

Cancer is a constitutional disease, the heredity of which is scarcely questioned. To show that it is not considered congenital I quote Sir James Paget: "That which is transmitted from parent to offspring is not cancer itself, but a tendency to the production of cancer at some time far future from the birth."

Tuberculosis will require a little more attention. Up till the time of the discovery of the bacillus by Koch the hereditary nature of the disease was scarcely questioned. Now that the specific cause of the disease is recognised and acknowledged, heredity as a cause is looked on by many as absurd. That a hereditary predisposition to the disease does often exist in families I am quite convinced, and also that it may be conveyed through the male. There is certainly no immunity acquired in the case of recovery from tuberculosis, as in many specific diseases. But there is undoubtedly a predisposition to the disease communicated to the progeny; and the more generations affected with the disease the greater is the predisposition to it, until ultimately they cease to survive to procreate their species. In will be necessary to consider this point at greater length, as the very opposite has been affirmed and emphasised by those who Sansom calls the "pure micro-biologists in this country. No clinician of experience will be found to subscribe to this view. To show the views held regarding it before the discovery of the bacillus, I quote Sir Thomas Watson: "No one of the least observation can doubt that the disposition to consumption is often transmitted from parent to child." "Like other hereditary tendencies, it may skip over one or two generations and reappear in the next, just as family likenesses are known to do." "We have, therefore, in respect to scrofula, the rare conjunction of congenital disease and hereditary predisposition." He does not confound "congenital" and "hereditary." And he evidently believed in the immunity of certain families or individuals. He states: "There are some

in whom no exposure to impure air, cold, and wet, and no privations—in other words, no appliance of the influences calculated to bring the strumous diathesis into play—will ever produce any form of scrofula, will ever render them consumptive." At the time this was written the specific nature of the affection was not dreamt of. But his clinical experience convinced him that many individuals were practically immune to the disease.

It will now be desirable to give quotations from those who have considered it with a knowledge of the bacillus as the specific factor in causation of the disease.

Thoma, who looks at it influenced by the Weissmann theory, states, "This predisposition to tuberculosis is undoubtedly hereditary in many families."

Koch states, "Hereditary tuberculosis finds its most natural explanation, if we admit that it is not the infectious germ that is transmitted, but certain peculiarities which favour the development of the germ, afterwards brought in contact with the body—it is what we call the predisposition." The heredity of the predisposition he does not question.

Nocard says, "That which the affected mother transmits as its products is not the disease itself; it is the predisposition, the aptitude to contract it; in other words, the organism tuberculisable, or not tuberculisable."

Sanson relates at length a case in which a number of Devon cows and bulls, which had been imported, were removed from the Agricultural Institute at Versailles to a model dairy in the mountains of Auvergne, at Saint-Angeau, in the department of Cantal. They were introduced amongst a herd of the finest Auvergnate cows, the purpose being to cross the native cows with the Devon Bulls to improve the milking qualities of the animals; but it was a failure. In a few years all the Devons, male and female, died out from tuberculosis. And when Sanson visited the dairy in August, 1868, the crosses had all died out except one, while the pure Auvergnates remained healthy. These animals were all stabled together, all grazed together on the same pastures, and Sanson contends that if the dissemination of the disease had been entirely due to contagion the Auvergnate cows would also have suffered, whereas all without exception escaped.

Enough has been done to show that those who have made a special study of the subject recognise the hereditary predisposition to tuberculosis.

Referring next to diseases of the circulatory organs, there is, perhaps, no organ in which the hereditary predisposition to disease is more marked than in the heart. I have known of several members of the same family dying of heart disease at about the same age, although of different occupations, under entirely different circumstances, and in different countries. It was confined to the male members of the family.

My friend Mr. Anderson, veterinary surgeon, Keith, has brought to my notice a well-marked case in the horse. Mr. S——, of S. Banffshire, had a Clydesdale mare from which he bred four foals. The first two died successively of disease of the heart, and Mr. S—— sold the next two. But Mr. Anderson was able to trace them, and found that they died also—all four at about four years old. He states that the mother died subsequently, and that he had the pleasure of making a post-mortem examination on all the five, and that each had died from hypertrophy of the heart.

But diseases of the locomotory organs affect us more as veterinary surgeons than any other single class of diseases. A great many of them are undoubtedly hereditary. Many are due to conformation, and are in that sense congenital, and some are wholly congenital. While practising in Aberdeen I occasionally saw a congenital cripple, a mare which was used for breeding purposes. The facts of the case have been ascertained for me by my *late* respected partner—Mr. Thomson, of Aberdeen. This animal was the third foal bred from sound parents, and was a peculiar dun or mouse colour. This she may have inherited from her grandsire—Dusty Miller (258)—which, although not dun, was, as his name implies, a peculiar colour. From birth she never seemed right on the off fore-foot, and as the undeveloped condition of babyhood passed off, it became evident that there was enlargement of the pastern. In the efforts made to cure the abnormality she was fired and blistered twice for ringbone. Not improving, the owner, unwilling to destroy her, had her served at two years old. She bred a good sound foal, and did the same again the following year. The third successive year she was served by a hackney, the foal became a good, sound, useful animal. The fourth year she was again served by a Clydesdale, and bred a foal the same colour as herself, and suffering from congenital enlargement of the off fore pastern, the same pastern as herself. The foal was very like the dam in every way, and notwithstanding the experience gained from the dam, was kept until three years old, and sold for a five pound note.

The next case combines congenital and hereditary causes. A thoroughbred—a Queen's premium stallion—was stationed in Scotland for some seasons. When carefully examined it could be seen that he had one fore leg a little turned out at the knee and in at the toe. It was thought very little of, but it has been found that fully one half of his stock are similarly affected, but in a more marked degree. Most of them seem all right on the legs when born, and only begin to show the peculiarity after being weaned. It becomes worse until they are about two years old, after which there is generally some improvement. In another case, purely hereditary, a thoroughbred stallion travelled the same district for many years. His stock nearly all developed windgalls, not the small, soft, puffy swellings seldom quite absent in a horse that has done a fair amount of hard work, but by the time the animal had passed maturity they were large unsightly swellings, which in their later years sometimes caused lameness

Instances might be multiplied, but I will only refer to sidebone as an acquired character which is being transmitted. I consider sidebones generally due to the habit of shoeing with high calkins. In walking on hard roads the frog does not reach the ground, and the great strain thrown on the cartilages from want of frog pressure sets up a chronic inflammatory action resulting in ossification. And the predisposition to this acquired character certainly becomes transmitted.

From whatever point of view heredity is considered, whether physiologically or pathologically, its influence is undoubted. It is ever present and far-reaching in its effects. The more the subject is studied, the more its mystery and its magnitude impress one.

EXTRACTS AND NOTES.

THE RINDERPEST.

The preliminary investigations undertaken by the two French scientists from the Pasteur Institute, Drs. Danysz and Bordet, in conjunction with the Government veterinarian, Mr. A. Theiler, have been so successful as to warrant their advising the authorities to adopt their method of inoculation. The experiments were carried on at the trial station at Waterfall, Pretoria, from February 15th to June 15th. The report recently presented to the Government contains much interesting matter, and in addition to a summary and criticism of other methods of treatment, gives the following details of their procedure: For injections they use the fibrinated blood of "salted" animals, which they find to possess

a far greater antitoxic strength than either the gall of Professor Koch or the mixture of blood and gall and "Zucht" of the Waterburg method. With regard to inoculations with gall, since the publication of Professor Koch's report thousands of animals have been inoculated with the result that in some cases the gall must be looked upon as an actual infectant, communicating the disease to the inoculated animal; in other cases the gall can produce a mild disease, and thus the animals are "salted," while in others no results at all follow. The following are briefly the details of the method. For the purpose of procuring the blood those animals must be bled which have contracted the disease in its most severe form, and which have been "salted" one to five months previously, and have received at least one injection of rinderpest blood. The blood must be used after it has been defibrinated. The animals to be inoculated must be treated in two different ways, according to whether they are still healthy or already sick. The first injection is made with the blood from a "salted" animal; the inoculated animals are then allowed to mix with the sick oxen at the time of the first injection or on the following day, and for some days after. The second injection is made five days after the first, with 100 c.cm. of "salted" ox blood. Animals that are ailing at the time of injection receive from two to three times more blood from a "salted" ox than healthy animals. It is stated never to be dangerous to inject even large quantities of curative blood, and in the case of animals that have shown visible signs of rinderpest 200 to 300 c.cm. are injected immediately, and this is repeated two days later. With regard to the results which have been obtained by this method, in one case a herd of 106 healthy animals was treated, and all were satisfactorily "salted"; in another case 260 infected animals were also inoculated, and not a single one died. Fifty-three others which were advanced in the disease were inoculated, with the result that only three died, the remaining 50 being completely cured. With a view of taking the necessary steps to prevent the possible return of the rinderpest, it is proposed to convenue a congress at which shall be represented the Governments of the South African Republic, the Orange Free State, Cape Colony, Zululand, Natal, and the Portuguese possessions. In order to facilitate the speedy trial of the above methods, Drs. Danysz and Bordet have offered to place three of their assistants at the disposal of the Government.—*The Brit. Med. Journal.*

THE ANTIVENOMOUS AND ANTITOXIC QUALITIES OF BILE.

Professor Fraser, M.D., F.R.S., writes to *The British Medical Journal*:—"In a paper recently published in *The British Medical Journal* (July 17th, 1897), in which it was shown that bile is able to prevent death from lethal doses of venom, the conviction was expressed that bile would be found also to possess antitoxic properties against the toxins of disease, such as of diphtheria, tetanus, etc. Experimental evidence in confirmation of this conviction has since been obtained.

Thus there was given by subcutaneous injection to a rabbit 0.15 c.cm. per kilo. of diphtheria toxin mixed with 0.05 gramme per kilo. of the dried bile of normal rabbits, and to a second rabbit also 0.15 c.cm. per kilo. of diphtheria toxin, but mixed with 0.025 gramme per kilo. of rabbit's bile. No remarkable symptoms were produced except a temporary rise of temperature, and both animals are now in good health, (a month after the injections had been made), and both have gained in weight.

The toxin employed was kindly given to me by Dr. Noël Paton, Superintendent of the Research Laboratories of the Edinburgh Colleges. Portions of the same toxin were also injected without bile under the skin of three rabbits, one receiving 0.15 c.cm., the second 0.075 c.cm., and the third 0.05 c.cm. per kilo; and all these rabbits have died, the first in from two to three days, the second in from eight to nine days, and the third in from ten to eleven days.

In the paper referred to it was shown that there is present in the bile of serpents a constituent or constituents, the process for whose separation was described, which possesses in a concentrated form the antidotal qualities of the bile itself. By a similar process there has now been separated from the bile of the ox a constituent which likewise possesses antivenomous qualities in a more powerful degree than the original bile. Experiments with this product have as yet been made only on white rats. They show that slightly larger than the minimum lethal dose of Indian cobra venom can be rendered non-lethal when mixed with so small quantities of this ox bile product as 0.004 g., 0.003 g., 0.002 g., and 0.001 g. per kilo. These quantities, though small, are not, however, so minute as the quantities effectively antivenomous in similar circumstances of the product derived from the bile of venomous serpents.

The evidence already obtained, no doubt suggesting extension and elaboration in various directions, seems, therefore, sufficient to establish that in addition to its generally recognised functions bile possesses the power of rendering inert such organic poisons as venoms and disease toxins.

ANTHRAX.—HOW IT IS SPREAD.

Not long ago we reviewed the report of the Anthrax Committee of the Home Office. Since then another death has taken place in Bradford, that of a female aged 28 years. Dr. Lodge, the police surgeon of Bradford, found the bacillus anthracis in large numbers in the blood of the deceased, and the corpse, as is usual in these cases, underwent rapid decomposition.

The sad interest of the case centres in the fact that in spite of the recent regulations issued by the Home Secretary, the foreman of the factory, while acknowledging his familiarity with the regulations, admitted that the bales of wool had not been opened by the deceased as they ought to have been—over a fan in a room specially provided for this purpose, and separate from the ordinary sorting room; nor was the dust which collected in the fan removed twice a week, as required by the rules, but only once. The owners of the factory had been unfortunately advised to place a box in such connection with the fan that the dust would not escape into the open air. This had the effect of reducing the ventilating power of the fan. Naturally, one would imagine that dust of such a dangerous nature as that which gathers in the fan of a woolsorting factory would have been burned immediately it was removed, but instead of this being the case simply because it had a money value we learn from the evidence tendered at the coroner's inquiry that it was sold to manure merchants and used for fertilising purposes. If, as we showed in our review of the report of the Anthrax Committee, the escape of this dust is prejudicial to life outside the factory, there must have been considerable risk incurred in allowing it to be sold for manurial purposes. In our earlier paper we recommended the sterilisation of all bales of foreign wool by steam under high pressure previous to their being opened in the sorting room; and we see no reason to depart from this position, but fresh cause for repeating the recommendation. Fans and improved methods of ventilation are all very well for the removal of dust, but the essential point is to destroy all the virulent properties of the wool previous to its being unpacked from the bales; the danger to the health of the workpeople consequent upon inhalation of

the dust will thereby be largely averted. There has been some delay in the issuing of fresh rules from the Home Office, but since an understanding has been come to between the Factory Department at Whitehall and the Bradford Chamber of Commerce and the District Trades and Labour Council, it is to be hoped that the enforcement of the new regulations will, by improving the conditions under which woolsorting is carried on, succeed in further diminishing, if not entirely abolishing, death from anthrax, from which Bradford and certain parts of Yorkshire have enjoyed of late an unenviable notoriety. *The Brit. Med. Journal.*

MEAT INSPECTION.

The Sanitary Association of Scotland had their annual congress at Dundee. Principal Dewar, Edinburgh, read a paper on the inspection of meat. The learned Principal said that, apart altogether from specific organisms of disease, there were diseases of a sceptic nature, in which the flesh or tissues of the animal were tainted, in some cases almost saturated, with poisonous ptomaines, albumoses, or toxins, which were not always broken up or rendered innocuous by boiling. Besides being generated in the tissues of the living animal by these pathogenic organisms, these or similar substances might be formed in the tissues after death, owing to commencing decomposition, by saprophytic or putrefactive organisms. Cases were still frequently occurring of meat being seized and condemned as unfit for human food which had undoubtedly been intended for that purpose. And if seizures were not quite so frequent as they once were, it was unwise to assume that it was due to a cessation of the practice. It was well known that in some towns and some districts inspection was at present more strictly carried out than in others, and those individuals who made a practice of disposing of inferior and unwholesome food were not likely to be the last to learn where inspection was most lax. The Public Health Act that had recently been added to the statute book went very much further than the last one in the way of prevention. Under it there would be no necessity for waiting until the animal was slaughtered and its flesh put into the market. Animals obviously diseased and unfit for human food could be seized while alive, and if the presumption was that they were intended for human food the owner could be proceeded against, and even the original seller in the event of the owner being a butcher or dealer who had recently purchased the animal. Everyone would admit that the law as it stood at present was unjust to the butcher, who might buy an animal in good faith at full market price and have the carcase condemned It was unjust that he should bear all the loss. It was a much more difficult question whether the breeder or feeder should bear it in the event of an animal apparently in perfect health being condemned after slaughter as unfit for human food. But that opened a wide question, into which he could not at present enter. The Principal then proceeded to argue that the only satisfactory system of meat inspection was in the slaughter-house by qualified veterinary practitioners, and those towns which did not already have public slaughter-houses should be called upon to provide them, so that the private slaughter-house should be done away with. In regard to carcases condemned for being tainted with tuberculosis, he said that undoubtedly there was a great deal of good meat in carcases condemned as tuberculous, and he approved of the system in use in the many continental countries by which carcases tainted with tuberculosis were sterilised by being subjected to a very high temperature under expert supervision and then allowed to be used as food.—*N. B. A.*

THE ORIGIN OF THE BRITISH MEDICAL ASSOCIATION.

When, in 1832, Sir Charles Hastings, of Worcester, communicated to a few of his personal friends the idea he had conceived of a medical association which should bring the whole provincial profession of England into a common brotherhood, it may be safely affirmed that he did not dream that he was laying the foundation of an association which would ultimately not only embrace the whole of the British Isles, but extend to that Greater Britain beyond the seas, and become an association of imperial magnitude and of imperial importance and significance. I have no hesitation in expressing my belief that the British Medical Association will be an important factor in bringing to a successful issue that great scheme of imperial federation which now exercises the minds, and let me add the hearts, of the leading statesmen of the empire. Sir Charles Hasting's aim was to bring town into professional union with town, county with county ; now it has become the aim of the Society he called into being to add State to State—and may I not say continent to continent?—until all the nations and peoples who live under the British flag are brought within the beneficent influence of the Association.

With respect to the objects of the Association, as set forth on its foundation, they may briefly be stated to be :—

1. The collection of speculative and practical information through essays, hospital reports, infirmaries, dispensaries, or private practice.

2. Increase of knowledge of the medical topography of England through statistical, meteorological, geological, and botanical inquiries ; the investigation of the modification of endemic and epidemic diseases in different situations and at various periods, so as to trace, as far as the recent state of the art would permit, their connection with the peculiarities of soil and climate or with the localities, habits and occupations of the people.

3. The advancement of medico-legal science through succinct reports of cases occurring in courts of judicature.

4. The maintenance of the honour and respectability of the profession generally in the provinces by promoting friendly intercourse and free communication of its members and by establishing among them the harmony and good feeling which ought ever to characterise a liberal profession.

During its earliest years the movements and proceedings of the Association were quiet and unostentatious, the meetings simple in their arrangements ; but it was not long before medical societies began to join the newer body, and towns in all parts of the Kingdom soon came to regard it as an honour to entertain the Association. Gradually the best men of each district enrolled their names, and the membership increased so greatly that sub-divisions into branches became a necessity. Each branch with its own ordinary and annual meetings, became practically a replica of the parent Society, possessing its own President, vice-president, secretary, and bye-laws. In 1837—five years after the foundation of the Association—there were three of these branches formed, namely, the East Anglian, the Bath and Bristol, and the Lancashire and Cheshire. By the end of 1878 the Association had spread over the whole United Kingdom, the total number of branches at that date being 30.—*The Brit. Med. Journal.*

Sporting Match at Newbridge.

On Tuesday evening last when returning from the Curragh Races, some well-known local "sports," as our friends across the "Herring Pond" would dub them, turned their tastes to pedestrianism, and on the spot a

match to run 100 yards was made between a local V.S. and a licensed vintner of much fame for his sporting proclivities, both of whom have long since attained their majority and are of considerable averdupois. The latter had as his backer a gentleman of renown at the Bar who was willing to back "his fancy" for £50. The former's friends were not so sweet on his chance and refused to put the coin down or even to back their man for any amount, but he himself not wishing to show the white feather pluckily planked down £10, which was immediately covered, and the two stakes placed in the hands of an official of a well-established bank in the one-sided town. Judge and starter were then chosen, and the course selected was in a field near the Gas Works. From the flagfall the "L.V." on the inside got best away, and for 30 yards held a slight lead when the "V.S." drew level. Some boring knocked the latter out of his stride, but running gamely on he again drew up to his opponent at the 80 yards mark, and eventually won easily. The stakes were paid over, and friend and "foe" retired to celebrate the truly sporting event in truer Irish fashion.

LIFE-HISTORY OF THE EEL.

At the recent meeting of the British Association at Toronto, Professor Miall, F.R.S., presided in the Zoology Section. From his address the following is taken :—

"The reproduction of the common eel has been a mystery ever since the days of Aristotle, though a small part of the story was made out even in ancient times. It was long ago ascertained that the eel, which seeks its food in rivers, descends to the sea in autumn or early winter, and that it never spawns nor even becomes mature in fresh waters. The eels which descend to the sea never return, but young eels or elvers come up from the sea in spring, millions at a time. The elvers have been seen to travel along the bank of a river in a continuous band or eel-rope, which has been known to glide upwards for 15 days together. It was of course concluded that spawning and early development took place in the sea during the interval between the autumn and spring migration, but no certain information came to hand till 1896. Meanwhile this gap in our knowledge was a perplexity, almost a reproach, to zoologists. The partially-known migration of the eel could not be harmonized with the ordinary rule of migratory fishes. We tried to explain the passage of marine fishes into rivers at spawning time by the supposition (a true supposition, as I think) that the river is less crowded than the shallow seas, and therefore a region in which competition is less severe. The river is to some migratory fishes what the tundras of Siberia are to some migratory birds —places comparatively free from dangerous enemies, and therefore fit for the rearing of the helpless young. But the eel broke the rule, and cast doubt upon the explanation. The salmon, sturgeon, and lamprey feed and grow in the sea, and enter rivers to spawn. The eel feeds and grows in rivers, but enters the sea to spawn. What possible explanation could meet cases thus diametrically opposite? This was the state of matters when Grassi undertook to tell us that part of the history of the eel which is transacted in the sea. When it leaves the river it makes its way to very deep water, and there undergoes a change. The eyes enlarge, and become circular instead of elliptical : the pectoral fins and the border of the gill-cover turn black ; the reproductive organs, only to be discovered by microscopic search before this time, enlarge. The eels, thus altered in appearance and structure, lay their eggs in water of not less than 250 fathoms deep. The upper limit of the spawning-ground is nearly three times as far from sea-level as the 100-fathom line which we arbitrarily quote as the point at which the deep sea begins. The eggs, which are large for a fish (2·7mm. diam.), float but do not rise. The young which issue from them are quite unlike the eels of our rivers ; they are tape-like, transparent, colourless, devoid of red blood, and armed with peculiar teeth. A number of different kinds of such fishes had been previously known to the naturalist as leptocephali. Günther had conjectured that they were abnormal larvæ, incapable of further development. Grassi has, however, succeeded in proving that one of these leptocephali (*L. brevirostris*) is simply a larval eel ; others are larvæ of congers and various murænoid fishes. He has with infinite pains compared a number of leptocephali, and co-ordinated their stages, making out some particularly important ones by the direct observation of live specimens. You will not unnaturally ask how Grassi or anybody else can tell what goes on in the sea at a depth of over 250 fathoms. His inquiries were carried on at Messina, where the local circumstances are very fortunate. Strong currents now and then boil up in the narrow strait, sweeping to the surface eggs, larvæ, and a multitude of other objects which at ordinary seasons lie undisturbed in the tranquil depths. Further information has been got by dredging, and also by opening the body of a sun-fish (*Orthagoriscus mola*), which at certain times of the year is taken at the surface, and is always found to contain a number of leptocephali. When a leptocephalus has completed its first stage of growth, it ceases to feed, loses bulk, and develops pigment on the surface of the body. At the same time the larval teeth are cast, and the larval skeleton is replaced. Then the fish begins to feed again, comes to the surface, enters the mouth of the river, and, if caught, is immediately recognized as an elver or young eel. It is now a year old, and about two inches long.

SPANISH SILKWORM GUT.

The United Stated Consular Agent at Grao, in Valencia, describes in a recent report the curious industry of preparing the so-called gut of the silkworm for fishing lines, for which it is much used by reason of its great tenacity and its transparency. Since the decline of silk culture in Spain the gut industry has increased, until now about four per cent. of the Spanish silk grubs are used in it. After the grub has eaten enough mulberry leaves, and before it begins to spin, in May and June, it is thrown into vinegar for several hours. The insect being thus killed the substance which, if alive, it would have spun into a cocoon is drawn out from the dead worm into a much thicker and shorter silken thread. This is an operation requiring dexterity and experience. Two thick threads from each grub are placed for about four hours in clear, cold water, after which they are dipped during 10 or 15 minutes in a solution of some caustic, soft soap dissolved in water being used in Grao. This loosens the fine outer skin, which is then removed with the hands, the workman holding the thread between his teeth. The silk is then hung up to dry, care being taken to choose a shady place, as the sun makes the threads too brittle afterwards. In some places these silk guts are bleached with sulphur vapour, which makes them look beautifully glossy and snow white, while those dried naturally always retain a yellowish tint. The quality of the gut depends on the health of the worm, round being good and flat a bad quality. The thickness also depends on the condition of the worm. The Spanish worm produces, as a rule, a thicker thread than those from Italy and Greece. The threads are made up in neat bundles of a hundred, and are sold by ten of these bundles, or a thousand threads, at from 6s. to 16s., according as the threads are flat or round. They are sold whole-

sale during the first four months of the year and retail during the fishing months. The Spanish peasants travel every year, with the threads packed in boxes, up and down the Mediterranean coast of Spain as far as France. Murcia is the chief place for the industry, but Valencia is considered the best market.

The Sanitary Institute—Congress 1897.

The sixteenth congress will be held at Leeds from September 14th to September 18th.

GENERAL ARRANGEMENTS.

ADDRESSES AND LECTURES.—President's Inaugural Address: Lecture to the Congress: Popular Lecture.

SECTIONS.—I. Sanitary Science and Preventive Medicine: II. Engineering and Architecture: III. Chemisrty, Meteorology and Geology.

CONFERENCES.—On River Pollution: Of Municipal Representatives: Of Medical Officers of Health: Of Municipal and County Engineers: Of Sanitary Inspectors: Of Ladies on Domestic Hygiene.

EXHIBITION.—An exhibition of apparatus and appliances relating to health and of domestic use will be held in connection with the Congress.

Neglecting to Notify Glanders.

At Southwark, Mr. Ailsby, contractor. of Cross Street, Chelsea, was summoned by the London County Council for neglecting to notify to a police officer the fact that he had a horse suffering from glanders, and, further, with causing the animal to be led through the street from Chelsea to Blackfriars. According to the evidence for the prosecution, the horse was sent to Harrison's knackers' yard at Green Street, Blackfriars, because it had been unwell. Suspicion was aroused that the animal was suffering from a contagious disease, and a veterinary surgeon who was sent for certified that the horse was suffering from glanders. In defence Mr. Ailsby denied that he had any knowledge of the actual condition of the animal, otherwise he would not have allowed it to be stabled with his other horses. Mr. Fenwick said the defendant had not exercised proper care to find out the animal's condition. Serious consequences were likely to arise from such neglect, and he would be fined £10 and £2 2s. costs.

Sending Cheques by Post.

Mr. Commissioner Kerr, in the City of London Court, tried a case in which Mr. John Burbidge, advertisement agent, Moorgate Street, E.C., sued Mr. L. A. Loftus, Elsham Road, Kensington, to recover the sum of 19s. 6d. for advertisements inserted. It seemed that the defendant had, without any request from the plaintiff, sent him through the post a cheque for the amount. The cheque was stolen, so the defendant said, from the plaintiff's office, the endorsement forged, and the cheque paid. The defendant's contention was that that constituted payment. The plaintiff said that he had never received the cheque. Mr. Commissioner Kerr told the defendant that when a member of the public chose to send a cheque by post he did so at his own risk. If it got lost or stolen he must put up with the consequences. The plaintiff never having received the cheque the defendant could not be held to have paid him. He must just pay the money over again; that was all.

ARMY VETERINARY DEPARTMENT.

Veterinary-Captain Forsdyke has been appointed veterinary officer on the staff for the Mohmand expedition moving from Peshawur.

Vet.-Lieut. Tatum has been appointed veterinary officer with the 2nd brigade of the expedition.

MR. FINLAY DUN.

The veterinary profession has sustained a great loss by the death of Mr. Finlay Dun. The fatal termination has not come unexpectedly, for the attack of paralysis which seized him some time ago has never relaxed its grasp. Death has brought a merciful release; partial recovery would probably have been attended with that worst of all afflictions—cerebral weakness. The deceased gentleman has left a distinct mark upon his profession. For many years our students had no other text book of therapeutics and materia medica than the well known work on *Veterinary Medicine*. It passed through many editions, each one being brought up to date by its indefatigable author. All the four veterinary schools adopted it as a class book, and in very few surgeries of practitioners did one fail to find it on the table.

Mr. Dun contributed regularly to *The North British Agriculturist* and no veterinary column ever contained better articles. The amount of good conferred on owners of stock by his sound science and lucid style of writing must have been immense. His readers were not supplied with superficial directions enticing them to blindly experiment upon their animals, but with clear statements of the nature of disease and the best methods of prevention. Such articles were of direct benefit to stock-owners, and of almost equal benefit to veterinary surgeons by enabling their clients to appreciate the value of properly trained practitioners over the quack and impostor.

Mr. Finlay Dun was a student at Dick's Veterinary College, and took the certificate of the Highland and Agricultural Society in 1849. For some years he was a teacher at the School and later an examiner. When the real union of veterinary surgeons was brought about and the Charter of 1879 granted, Mr. Dun joined the Royal College of Veterinary Surgeons. In 1886 he submitted to examination for the Fellowship, and thus late in life set an example to all practitioners. In 1882 he was elected a member of the Board of Examiners of the Royal College of Veterinary Surgeons, a position which he has filled with honour to himself and profit to the College from that date to the time of his death. Mr. Dun was also a vice-president of the Corporate Body from 1880 to 1883. With a quiet genial manner he possessed strong convictions, and a full share of that strength of character which seemed to be developed in all William Dick's prominent students. The whole profession will regret his decease, but only those who knew him personally will correctly estimate the loss we have sustained.

CORRESPONDENCE.

"LOOSE CARTILAGE IN STIFLE JOINT."

Sir,

I take it that, for the majority of veterinary intelligence, my explanation of case was sufficiently distinct, and my enquiry was for any others.

It is obvious from the tenor of "Enquirer's" remarks that he doubts the veracity of my statements; but it will afford me the greatest pleasure to identify his personality, as well as give every facility for seeing horse.

I am yours faithfully,

J. DUNCAN MILLER.

COMMUNICATIONS, BOOKS, AND PAPERS RECEIVED:—Messrs. E. White Wallis, M. Tailby. *The Birmingham Daily Post.*

Communications for the Editor to be addressed 20 Fulham Road, S.W.